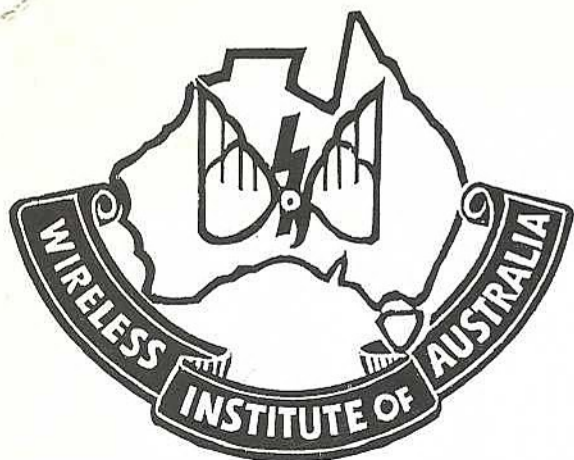
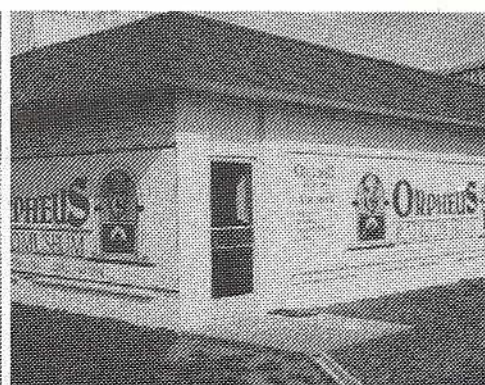
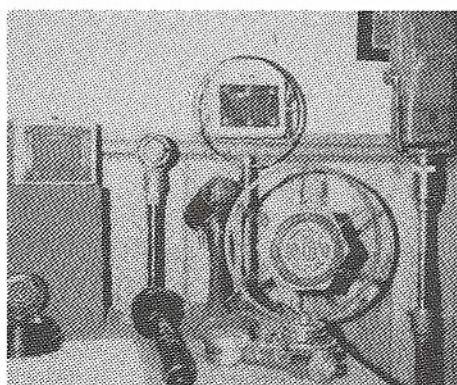


Aug 89 ①



B·A·R·G^① NEWS



© Monthly Newsletter of the
Ballarat Amateur Radio Group

BALLARAT AMATEUR RADIO GROUP INCORPORATED

OFFICERS 1988-1989

EXECUTIVE COMMITTEE

			HOME	BUSINESS
President:	JOHN HAZLEDINE	VK3 CFH	39 1971	39 1035
Imm. Past President:	RON WATKINS	VK3 XOA	35 6017	32 1447
Vice President:	GORDON CORNELL	VK3 PUW	39 2427	39 1135
Secretary:	JIM WRIGHT	VK3 CFB	32 7563	
Treasurer:	HARRY HEKKEMA	VK3 KGL	35 7563	39 1001
Asst. Secretary:	GEORGE FOWLER	VK3 DOK	32 6863	39 1954
Publicity Officer:	CLARRY KITZELMANN	VK3 DMK	38 1044	35 7756
Education Officer:	IAN McDONALD	VK3 AXH	41 3717	31 1317
Net Co-ordinator:	FRED QUICK	VK3 KQF	32 3216	
Technical Officer:	DICK ANTOZIEWICZ	VK3 AEX	32 3273	31 1818
Memb. Representative:	NEAL DAVIDSON	VK3 KQQ	35 9612	

OFFICERS AND COMMITTEES

Newsletter Editors:	BOB TERRILL	VK3 BNC	39 5317	39 1001
	HARRY HEKKEMA	VK3 KGL	35 7563	39 1011
Q.S.L. Manager:	JEFF PIGDON	VK3 PAP	32 7041	31 1211
Awards Manager:	MAURIE BATT	VK3 XEX	42 2245	
Property Officer:	DICK ANTOZIEWICZ	VK3 AEX	32 3273	31 1818
Hamfest Convenor:	KEVIN HUGHES	VK3 WN	35 5011	
WICEN Committee:	GORDON CORNELL	VK3 PUW	39 2427	39 1135
	DICK ANTOZIEWICZ	VK3 AEX	32 3273	31 1818
	GEOFF SMITH	VK3 ADB	33 2112	
Technical Committee:	IAN ROBINSON	VK3 BTX	35 8031	
	MAURIE BATT	VK3 XEX	42 2245	
	PHIL SEDDON	VK3 AQM	31 5220	
	MURRAY FELSTEAD	VK3 AAI	41 2234	

B.A.R.G. meets on the LAST FRIDAY in every month except December at the Ballarat Education Centre, Hopetoun St., Ballarat at 7.30 p.m.

Committee meetings are held at the Education Centre on the Wednesday two weeks prior to the Club meeting at 7.30 p.m. Executive committee members are expected to attend and any club member with business for discussion is welcome.

All correspondence to: The Secretary, BARG Inc., P.O. Box 216E, Ballarat East, 3350.

Applications for Awards to: Maurie Batt, RSD, Rokewood Junction, 3351.



CNR. RING RD. & WESTERN HWY BALLARAT
(OPEN 10AM - 5 PM 7 DAYS A WEEK)

FEATURES

- GRAMOPHONES • VINTAGE RADIOS • VISITORS PARTICIPATION
- MEMORABILIA • AUDIO DISPLAYS • DEMONSTRATIONS • CRYSTAL SETS

The "Orpheus Radio Museum" is operated by Richard and Sonja Wilson.
The collection includes their private collection, the 3BA collection and other items on loan to the museum.
The museum is run with the idea of preserving the history of radio in Australia and making it accessible to the public.
If anyone has any information or items of interest to the museum, would they please contact, or write to, the "Orpheus Radio Museum" RSD B98, Ballarat 3352. Telephone (053) 34 2513.
Let the public enjoy your piece of Radio History.

MINUTES OF GENERAL MEETING HELD 28th JULY 1989.

MEETING OPENED at 7.50pm by President Gordon VK3 KGC with 22 members in attendance.

APOLOGIES VK3 BNC, KGL, DS, VU, AEX, PAL, VPX, NIZ, SE, PUA.

MINUTES of previous meeting as circulated were confirmed after two errors namely; David Burger donated a Filter not a Crystal and the Past Presidents report was received on a motion proposed by CFH not CFJ, were rectified. KAW/CFH

CORRESPONDENCE OUT. David BURGER thanks for donation of Filter.
Corporate Affairs Dept report of AGM.

TREASURERS REPORT General a/c \$1154.41. VS&L \$3351.23. DOK/AAP.

QSL MANAGER Jeff PAP received 856 cards in, Details of the new procedures for the VK3 inwards bureau in the next Newsletter.

PUBLICITY Officer Clarrie DMK submitted details of AGM to Amateur Radio.

EDUCATION Officer Ian AXH is keeping Novice class going until August exams

WICEN Gordon reported that the Nissen Car Rally had to be cancelled and it is hoped that it can be held on 16th of September.

HAMVENTION Convener Kevin WN reported that the Committee had recommended;
Two raffle prizes- \$100 and \$25 worth of petrol.
Door Prize of \$50. Competitions as last year.
VHF Antenna testing station, and Home Brew contest.
These recommendations were approved by the members.

PACKET RADIO Murray AAI presented a balance sheet for the Digital Repeater and it was decided to purchase an antenna for same.

GENERAL BUSINESS. Kevin WN reported that School of Mines and BCAE libraries are open to the public with many technical publications.

Moved PAP seconded DOK that club will participate in in JOTA to be held on 21st & 22nd October. Carried.

It was proposed by Ian AXH that the Club hold a 2mtr Scramble on Sunday nights at around 7.30pm. This was approved and further details will be forthcoming.

With the devolvment of examinations anticipated early next year and the very good chance that BARG will become an examing body, it was resolved that Ian AXH should form a committee to co-ordinate arrangements.

Discussion on subscriptions to various technical magazines was deferred to the next meeting.

It was decided that the Club re-instate the monthly raffle that we used to have. It is anticipated that the prize will be a useful book. This raffle is not intended to make money but to add a bit of fun to the meeting, the Club will subsidise the difference between the money received and the cost of the prize.

MEETING CLOSED 9.05pm.

#####

73s. Jim CFB.

NEXT BARG MEETING 25th August at Education Centre. 7.30pm.

NEXT COMMITTEE MEETING 18th September at KGCs QTH.

#####

FREE REGULATIONS BOOKLET PRINTED

The DOTC brochure entitled "Licence conditions and regulations applicable to the Amateur Service" is now available.

The publication is also commonly known as DOTC 71, and until now only photocopies of the text have been released by the Department.

However after lengthy delay this brochure has been printed, and copies are available from the WIA Victorian Division office, or directly from DOTC.

The brochure is one of three to be published for the Amateur Service in Australia.

The "Operating procedures" brochure, DOTC 72, is currently with the Government Printers.

And the third brochure, DOTC 70 which details examinations and licencing procedures is not expected until next year after examination development has begun.

27TH A U G U S T ----- 2 M E T R E ----- S C R A M B L E

AT 7-45PM ON SUNDAY 27TH AUGUST JOIN IN THE BARG 2 MX SCRAMBLE.

THE CONROL STATION FOR THIS EVENT WILL BE GIVING DETAILS OF THE RULES FOR THE CONTEST AND THEN WHEN THE BUTTON DROPS. GO FOR IT!!!

THE CONTROL FREQUENCY WILL BE CHAN 50. (146.5)

RULES.

1. EACH STATION CAN ONLY BE CONTACTED ONCE AND ONE POINT IS AWARDED FOR THAT CONTACT.
2. A CONTACT WITH A MOBILE STATION GAINS TWO POINTS.
3. FREQUENCIES FOR THE SCRAMBLE WILL BE FROM 146.425 TO 146.6MHZ.
4. THE SCRAMBLE WILL COMMENCE AT 7-50PM AND END AT 8-10PM.
5. AT THE END OF THE SCRAMBLE RETURN TO CHANNEL 50
6. THE WINNER IS THE STATION WITH THE HIGHEST POINTS.

REMEMBER:- THIS IS A TRIAL AND THERE WILL BE SOME CONFUSION AND SOME ARGUMENTS BUT WE HAVE TO START SOMEWHERE!!

FOR SALE

YAESU FT227RB 2M DIGITAL FM TX FULL
BAND COVERAGE - SCANNING & 4 MEMORIES. 10 WATTS.
\$300-00

YAESU 208R 2M HAND HELD FM TRANSCEIVER
10 MEMORIES, SCANNING. MOBILE MOUNT AND MIC/SPEAKER
\$330-00

CONTACT ERNIE TURNER 370 375 BH.
317 604 AH.

WIRELESS INSTITUTE OF AUSTRALIA
Victorian Division

File: sys/qslin.doc

June 1989.

INWARDS QSL BUREAU

The Inwards QSL Bureau is operated as a FREE SERVICE TO MEMBERS OF THE VICTORIAN DIVISION. Non WIA members may use this service only after payment of a registration fee.

1. Firstly YOU MUST REGISTER with the Bureau by writing to -

VK3 Inwards QSL Manager,
Moorabbin & District Radio Club,
P.O. Box 88,
BENTLEIGH EAST. VIC. 3165.

and provide your NAME and CURRENT CALLSIGN ('S) and nominate a POINT OF COLLECTION from the list of distribution points.

2. Victorian Division members need to register ONCE ONLY, however you should advise the Bureau if you change your callsign or wish to change your collection point. Persons who are NOT MEMBERS OF THE DIVISION must update their registration on February 1 each year.

3. Cards, sorted in callsign order, will be mailed or delivered to distribution points every 90 DAYS at NO CHARGE. Any Distribution Point may, having made suitable arrangement with the Bureau management, arrange to collect cards at more frequent intervals.

4. DIRECT MAILING TO INDIVIDUALS will not be undertaken by the Bureau. Some distribution centres may make a mailing service available to members who reside in remote areas or who are unable to collect cards because of a physical disability. In this instance suitable arrangement will need to be made with the DISTRIBUTION POINT to cover any mailing cost involved. CHECK with your distribution point.

5. INCOMING CARDS FOR AMATEURS NOT REGISTERED WITH THE BUREAU will not be sorted into callsign order, however they will be held for collection at the REGISTERED OFFICE of the VICTORIAN DIVISION for a period of 90 DAYS, after which time they will no longer be available. High postage charges makes return of cards to senders non viable.

Collection of cards from the DIVISION OFFICE may only be made during normal office hours.

6. In excess of 8,000 cards are processed by the Bureau each month. This makes it IMPRACTICABLE FOR ALL CARDS TO BE INDIVIDUALLY SCRUTINIZED for the date on which the contact was made. Due to the decision by DOTC to immediately reissue callsigns it is possible for several licensees to use the same call sign on air during a year. A CALLSIGN CAN ONLY BE

REGISTERED WITH THE BUREAU UNDER ONE HOLDER. If a second person seeks to register the callsign, both the currently registered and subsequent person seeking registration will be advised that the registration is in dispute. No cards under that callsign will be processed until the dispute is settled. Persons seeking to register the same callsign will have to decide who should hold the registration. It is anticipated that such a dispute will be resolved by a mutual arrangement whereby the agreed registration holder will pass on cards received in respect of contacts made by the other party.

CARDS FOR RADIO AMATEURS WHO ARE NOT MEMBERS OF THE VICTORIAN DIVISION

Non Members cards can be processed in EXACTLY THE SAME WAY as cards for members, however, as members funds will not be utilized to finance services for others, AN ANNUAL FEE OF \$24.00 will be payable directly to the Bureau. This fee is applicable in respect of ALL RADIO AMATEURS WHO ARE NOT FINANCIAL MEMBERS OF THE DIVISION regardless of their membership status with any club.

This fee is due on February 1 each year, and is on a monthly pro rata basis. Eg. A person first registering with the Bureau in September will be required to pay initially for 5 months - \$10.00. On February 1 the Annual fee of \$24.00 will be payable.

Sorted cards will not be available in respect of months a person is not registered or a Non Member is "unfinancial"

Where a Non WIA Member nominates a Club as a Collection point, it will be entirely at the Club's discretion, as to whether it will handle the cards if the person concerned is not a member of that Club. If suitable arrangement cannot be made the Non Member will be required to collect sorted cards from the Victorian Division office at the appropriate times.

SPECIAL NOTE

Clubs who are registered as DISTRIBUTION POINTS will be required to handle cards for Radio Amateurs who are members of the Division, but who may not necessarily be members of the Club.

All enquiries relating to the operation of the Bureau should be made DIRECTLY WITH THE BUREAU MANAGER.

Moorabbin & District Radio Club may be contacted by telephoning 03 553 1483 on Tuesdays between 10am and 12 noon or by writing to the above address.

Bailarat Amateur Radio Group Inc.
P.O.Box 216E,
BALLARAT EAST VIC. 3350.
QSL MANAGER - G. Pigdon VK3PAP.

MORE MOBILE MEANDERINGS.

The first week in July found me travelling North in the Toyota Landcruiser to spend 6 days in a warmer climate. On board I had a friend, anxious to try this outback camping, and my son and his wife joined us in their own 4WD vehicle.

My first radio contact on the trip was via the Mt. William repeater when I was about 60 kms. south of Sea Lake. I heard VK3 MC call VK3 KAV and as both are friends, gave a call and Jamie responded although I was too far from the repeater to continue a lengthy Q.S.O.

Our first major stop was at the Robinvale Winery for essential supplies and I had a chat with a local shop-keeper via the Robinvale repeater and gained some road condition info. from him.

We camped that night off the track leading to Mungo National Park, the spot where remains of a woman who was buried with full ceremonies over 30000 years ago were discovered. That makes the mere 120 years ago that the woolshed was built sound a bit non-something, but the shed, built by Chinese labour from local murray pine is in very sound condition and worth a look. A mock-up of an extinct wombat - half the size of an elephant stands in the very interesting visitors centre and museum which was funded by Dick Smith. Rangers conduct tours across to the sandhills which are moving to reveal many relics and fossils of extinct animals and clues to life when this area was a permanent lake.

We travelled to Pooncarie on the Darling then upstream beside this flooding river where we camped near Menindie, pleased to be off the gray clay river tracks in case rain came again. I was able to make very good 40M. contact with Victorian friends at 5pm. each day during the trip but not so good with VK3 ABI in Queensland. At 5.30pm. an 80 M. sched had similar results with signal strength down only slightly from that on 40 M. We had a look through the hotel where Burke and Wills put in 11 weeks waiting for money and supplies to come up from Melbourne. A brother of the new proprietor showed us an arrow survey mark carved by the explorers (or so he said) on a verandah post at the rear of the hotel. In Burke and Wills' time, this was the front of the pub as the main road was of course the river at the time.

Cont.....

8
Mobile etc. cont..

After a look at the spillway and channel leading into Lake Menindie we headed for Broken Hill but being reluctant to stay on bitumen turned off at Quandong and headed north a few Kms to pick up the pipeline running paralel. We called at a pumping station and were given the royal tour by a lonely engineer who seldom sees a visitor. Some heafy 5 cylinder marine diesels thump away at 650 R.P.M. and use brine for cooling. (Old salts at heart you might say). We followed nice red muddy tracks along between rail and pipe lines to a spot near Broken Hill where we found a welcome car wash - in the form of a standpipe for truck filling. We then by-passed Broken Hill by finding an ancient track over the ranges and dropped down onto the Silver City Highway north of "The Hill". We drove up a sandy creek bed to find a camp site and next morning was cold and misty - the only nasty bit of weather on the trip.

The next couple of days we spent criss-crossing the Barrier Ranges on disused tracks with plenty of creek crossings and rocky climbs thrown in. Not much in the way of wildflowers yet and due to the growth, wildlife was not so obvious but I was surprised by the number of foxes.

I made several calls on the Mildura repeater on the return journey but got no reply, maybe everyone was shopping on that Saturday morning.

Of special interest to me on this trip was the "Travellers Net" run by VK6 B0. This was the first time out for me since getting my full call with which to use 20 M. The signal strength was always good and efficiency of the net operators is top class. It is amazing to hear the spread of callers from all over VK-land and water (their is usually the odd maritime M.) I am certainly looking forward to being part of that net again especially on a more adventurous foray where radio contact is essential.

Were you paying attention at 12.34pm plus 5 sec. on the 6th of July '89 ??? You should have noticed the configuration went 1.2.3.4.5.6.7.8.9. If you missed this momentous occasion, don't worry , it will come round again in 100 years. Thanks to Stan VK3 SZ for that bit of Tech.Talk.

Thanks to all those who kept contact with me during my trip.

Des, V.K.3 A.S.U.

BUILD A YAGI FOR 2 METRES

At the last BARG meeting, discussion took place in regard to construction of a two metre yagi which would be suitable for the F.M. part of the band and also the bottom (ssb) end. I must thank Charlie VK3 BRZ, Dick VK3 AEX and Stephen Walsh for supplying all the antenna data.

Construction should be simple and is made from 25mm square aluminium tube for the boom and 10mm tube for the elements. A small piece of 6mm tube is required for the gamma match if it is intended to use this form of matching.

The size of the antenna is your choice and can be determined from the information given. Shown below is a table from which you can obtain details. A typical design has been shown as a guide for those wishing to construct an 12 element yagi on 4.6 metre boom.

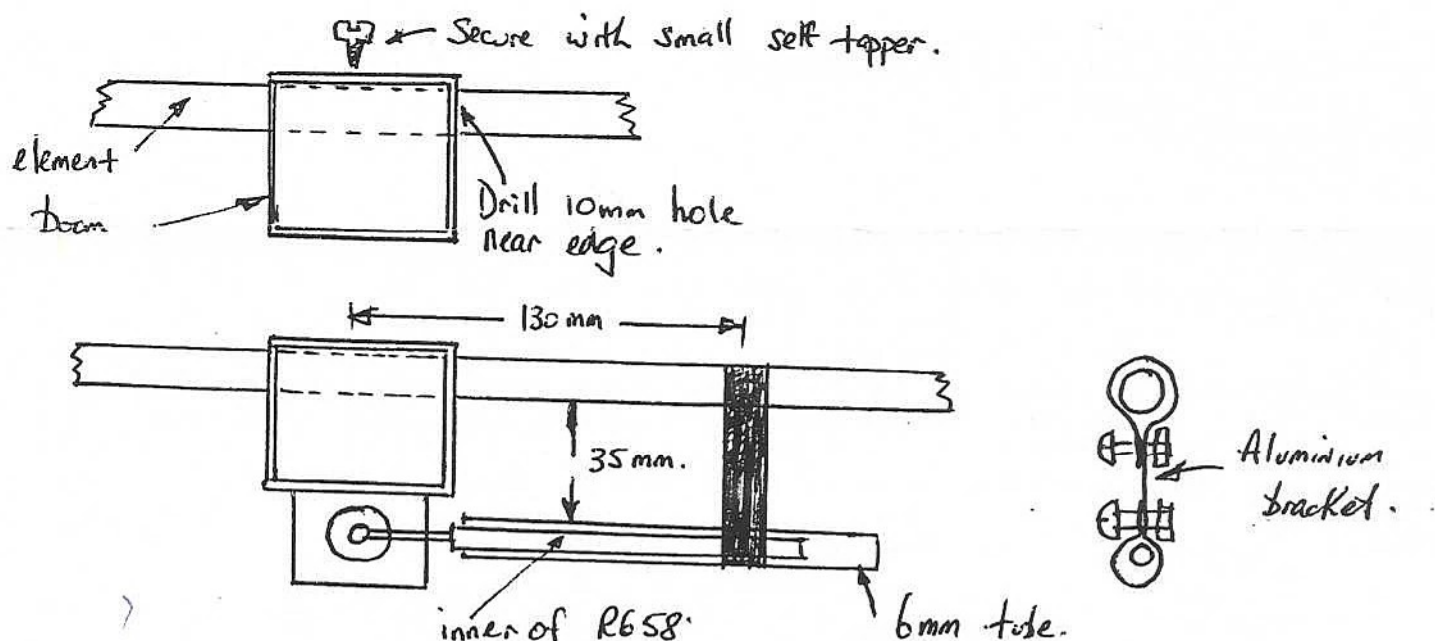
Boom length 4.6 metres (15')

Element lengths

1016mm	960	880	846	829	811	795	795	795	795	811	829
REFL.	DRN	D1	D2	D3	D4	D5	D6	D7	D8	D9	10.

all spacing between elements is 0.2λ centre to centre = 408mm (16")

Method of MOUNTING Elements.



10

To adjust the SWR simply use your bridge as close to the antenna as possible. As the antenna can be quite long you may rest the reflector on the ground and point the antenna towards the sky making sure it is clear of all metal objects. The gamma is adjusted by trimming the RG 58 inside the 6mm tube and it may be necessary to shift the aluminium clamp.

Finally test the antenna in its operating position.

Further information in regard to design can be obtained from the ARRL handbooks. People who do not have workshop facilities for cutting and drilling will be able to bring their material along to a construction night on a date yet to be fixed.

73's VK3 AXH

Length of Reflector, λ	Length of Yagi in Wavelengths					
	0.4	0.8	1.20	2.2	3.2	4.2
	0.482	0.482	0.482	0.482	0.482	0.475
1st	0.442	0.428	0.428	0.432	0.428	0.424
2nd		0.424	0.420	0.415	0.420	0.424
3rd		0.428	0.420	0.407	0.407	0.420
4th			0.428	0.398	0.398	0.407
5th				0.390	0.394	0.403
6th				0.390	0.390	0.398
7th				0.390	0.386	0.394
8th				0.390	0.386	0.390
9th				0.398	0.386	0.390
10th				0.407	0.386	0.390
11th					0.386	0.390
12th					0.386	0.390
13th					0.386	0.390
14th					0.386	
15th					0.386	
Spacing between directors, in λ	0.20	0.20	0.25	0.20	0.20	0.308
Gain relative to half-wave dipole, dB	7.1	9.2	10.2	12.25	13.4	14.2
Design curve (see fig. 4)	(A)	(C)	(C)	(B)	(C)	(D)

+109331 B BID: 52128VK8BBS
 Path: VK3YZW!VK3AVE!VK4AJL!VK2EHQ!VK8BBS
 Date: 16 Aug 89 04:03:24 L
 From: VK8ZLX-VK8BBS
 To: SOLAR-VKNET
 Subject: HF fade outs.

hello all wondering why HF has gone down the tube ????
 well we have had two yes two major flares in two days.
 both of these produced complete HF fade outs, for periods of up to several hours. Ionospheric sounders in Alice Springs have shown these to be of a major level, leaving the Ionosphere in a severely disturbed condition.
 Info courtesy JINDALEE Over The Horizon Radar.
 P.S we do not radiate in the amateur bands unlike the wood pecker

VK3YZW BBS - B,D,I,J,K,L,N,R,S,T,U,V,W,X,Y (? or H for Help) >

DESIGN FREQUENCY :- 144.10 MHZ.
 WAVELENGTH :- 2.08 METERS.
 NUMBER OF ELEMENTS :- 12.0
 DIAMETER OF BOOM :- 25.0 MM.
 DIAMETER OF ELEMENTS :- 10.40 MM.
 ELEMENTS ARE NOT INSULATED AND PASS THROUGH THE BOOM.
 ELECTRICAL BOOM LENGTH :- 6012 MM.
 BOOM WAVE LENGTHS :- 2.890
 MAXIMUM PRACTICAL GAIN :- 12.8 Dbd.
 HORIZONTAL BEAM WIDTH :- 30.07 DEGREES.
 VERTICAL BEAM WIDTH :- 34.55 DEGREES.
 HORIZONTAL STACKING DISTANCE :- 4.009 METERS.
 VERTICAL STACKING DISTANCE :- 3.503 METERS.

ALL DIMENSIONS IN MILLIMETERS.

: PROGRESSIVE DISTANCE FROM
 ELEMENT LENGTHS. ELEMENT CENTRE.: REFLECTOR.:END OF BOOM

REFLECTOR	1022.0	0.0
DRIVEN EL.	969.0	499.3
DIRECTOR # 1	920.7	655.3
DIRECTOR # 2	910.3	1029.8
DIRECTOR # 3	900.3	1477.1
DIRECTOR # 4	890.9	1997.2
DIRECTOR # 5	881.6	2579.7
DIRECTOR # 6	874.3	3203.8
DIRECTOR # 7	867.4	3859.1
DIRECTOR # 8	860.8	4545.6
DIRECTOR # 9	855.8	5263.4
DIRECTOR # 10	851.2	6012.4

ELEMENT SPACING IN MILLIMETERS.

REF.	-	D/E	499.3
D/E	-	DIR 1	156.0
DIR 1	-	DIR 2	374.5
DIR 2	-	DIR 3	447.3
DIR 3	-	DIR 4	520.1
DIR 4	-	DIR 5	582.5
DIR 5	-	DIR 6	624.1
DIR 6	-	DIR 7	655.3
DIR 7	-	DIR 8	686.5
DIR 8	-	DIR 9	717.8
DIR 9	-	DIR 10	749.0

NOTES

1. THE DIMENSIONS ARE FROM CENTRE TO CENTRE IN ALL CASES.
FOR EXAMPLE, THIS MEANS THE BOOM MUST BE CUT LONGER THAN THAT GIVEN TO BE ABLE TO MOUNT THE ELEMENTS. (IN THE ABOVE CASE THE LENGTH OF THE BOOM = 6062 MM.)
2. IF YOU WANT WIDE BANDWIDTH USE A FOLDED DIPOLE AS THE DRIVEN ELEMENT.
3. THE DRIVEN ELEMENT DIMENSION IS THE LENGTH OVERALL.
4. WORK MUST BE ACCURATE TO BETTER THAN 1MM AT FREQUENCIES ABOVE 400 Mhz.
5. ACCURACY BELOW 400 Mhz. SHOULD BE WITHIN 1.5MM.
6. ELEMENT MOUNTING MUST BE BETTER THAN .5MM OF THE ELEMENT CENTRE

YAGI DESIGN DETAILS :- VERSION 2.2C

DESIGN FREQUENCY :- 147.00 MHZ.
 WAVELENGTH :- 2.039 METERS.
 NUMBER OF ELEMENTS :- 12.0
 DIAMETER OF BOOM :- 25.0 MM.
 DIAMETER OF ELEMENTS :- 10.20 MM.
 ELEMENTS ARE NOT INSULATED AND PASS THROUGH THE BOOM.
 ELECTRICAL BOOM LENGTH :- 5893 MM.
 BOOM WAVE LENGTHS :- 2.890
 MAXIMUM PRACTICAL GAIN :- 12.8 Dbd.
 HORIZONTAL BEAM WIDTH :- 30.07 DEGREES.
 VERTICAL BEAM WIDTH :- 34.55 DEGREES.
 HORIZONTAL STACKING DISTANCE :- 3.930 METERS.
 VERTICAL STACKING DISTANCE :- 3.434 METERS.

ALL DIMENSIONS IN MILLIMETERS.

: PROGRESSIVE DISTANCE FROM
 ELEMENT LENGTHS. ELEMENT CENTRE.: REFLECTOR.: END OF BOOM

REFLECTOR	1002.1	0.0
DRIVEN EL.	950.1	489.7
DIRECTOR # 1	902.8	642.4
DIRECTOR # 2	892.6	1009.5
DIRECTOR # 3	882.8	1448.0
DIRECTOR # 4	873.6	1957.9
DIRECTOR # 5	864.5	2528.9
DIRECTOR # 6	857.3	3140.7
DIRECTOR # 7	850.6	3783.1
DIRECTOR # 8	844.1	4456.1
DIRECTOR # 9	839.2	5159.7
DIRECTOR # 10	834.7	5893.9

ELEMENT SPACING IN MILLIMETERS.

REF.	-	D/E	489.5
D/E	-	DIR 1	153.0
DIR 1	-	DIR 2	367.1
DIR 2	-	DIR 3	438.5
DIR 3	-	DIR 4	509.9
DIR 4	-	DIR 5	571.0
DIR 5	-	DIR 6	611.8
DIR 6	-	DIR 7	642.4
DIR 7	-	DIR 8	673.0
DIR 8	-	DIR 9	703.6
DIR 9	-	DIR 10	734.2

NOTES

1. THE DIMENSIONS ARE FROM CENTRE TO CENTRE IN ALL CASES.
FOR EXAMPLE, THIS MEANS THE BOOM MUST BE CUT LONGER THAN THAT GIVEN
TO BE ABLE TO MOUNT THE ELEMENTS. (IN THE ABOVE CASE
THE LENGTH OF THE BOOM = 5893 MM.)
2. IF YOU WANT WIDE BANDWIDTH USE A FOLDED DIPOLE AS THE DRIVEN ELEMENT.
3. THE DRIVEN ELEMENT DIMENSION IS THE LENGTH OVERALL.
4. WORK MUST BE ACCURATE TO BETTER THAN 1MM AT FREQUENCIES ABOVE 400 Mhz.
5. ACCURACY BELOW 400 Mhz. SHOULD BE WITHIN 1.5MM.
6. ELEMENT MOUNTING MUST BE BETTER THAN .5MM OF THE ELEMENT CENTRE